GEOPHYSICS

A Journal of General and Applied Geophysics

VOLUME CONTENTS

Volume 41 Nos. 1-6

1976

Published by the
SOCIETY OF EXPLORATION GEOPHYSICISTS

OFFICE OF PUBLICATION: SEG HEADQUARTERS
P.O. BOX 3098, TULSA, OKLAHOMA 74101, TEL. (918) 743-1365
MANUS FOSTER, *Editor*
Mobil R&D Corp., Box 900, Dallas, Texas 75221

GEOPHYSICS, December, 1976, Number 6, published by the Society of Exploration Geophysicists, P.O. Box 3098, Tulsa, Oklahoma 74101. Issued six times yearly. Second class postage paid at Tulsa and at an additional mailing office. Subscriptions are given to all members of the Society in good standing as part payment for their dues. Subscription rate for nonmembers and organizations is $30.00 per year in the U.S.A. and $33.00 per year in all other countries.

Vol. 41, No. 1 February 1976

PRESIDENT'S PAGE: The year ahead — *Robert B. Rice* 1

PAPERS

Synthetic seismograms: A finite-difference approach — *K. R. Kelly, R. W. Ward, Sven Treitel, and R. M. Alford* 2

A class of convolutional time-varying filters — *Keh Pann and Y. Shin* 28

The effect of finite data length in the spectral analysis of ideal gravity anomalies — *Robert D. Regan and William J. Hinze* 44

Remanent magnetization from comparison of gravity and magnetic anomalies — *D. H. Shurbet, G. R. Keller, and J. P. Friess* 56

Finite-difference resistivity modeling for arbitrarily shaped two-dimensional structures — *Irshad R. Mufti* 62

Quadripole-quadripole arrays for direct current measurements—model studies — *Dariu Doicin* 79

Interpretation of magnetotelluric resistivity and phase soundings over horizontal layers — *D. Patella* 96

Mapping porphyry copper deposits in the Philippines with IP — *William H. Pelton and Peter K. Smith* 106

Seeing through rock salt with radar — *Robert D. Stewart and Robert R. Unterberger* 123

An improved method of computing the thermal conductivity of fluid-filled sedimentary rocks — *A. E. Beck* 133

SHORT NOTE

Finite-element computation of seismic anomalies for bodies of arbitrary shape — *Bruce A. Bolt and Warwick D. Smith* 145

DISCUSSION

On: "Maximum-entropy spatial processing of array data" (R. N. McDonough) by *James W. Adams* with reply by author 151

REPORTS

Statement by Robert B. Rice before the U.S. House of Representatives Ad Hoc Select Committee on the OCS 152

Census of New Geophysical Employees and Graduates — *Robert E. Sheriff* 155

Geophysical Activity in Canada Continues Downward Trend 159

1974 Geophysical Aecident Report 160

Seismic Crew Survey 161

DEPARTMENTS

Reviews 162
New Publications Received 164
Abstracts
Patents 165
Memorial
Don B. Heaney 170
Contributors 171
Calendar of Meetings 175
Executive Committee Meeting Report 176
1975 SEG Awards 177
45th Annual Meeting 180
Announcements
46th Annual Meeting Call for Papers 191
Looking Back 194
Personal Items 195
Membership Applications Received 199
1976 OTC Program for Geophysicists 204
Mailgram to the U.S. President 206
New Products and Services A-12
Society and Industry News Briefs A-22
Professional Directory A-33
Advertisers Index A-80

Vol. 41, No. 2 April 1976

PRESIDENT'S PAGE: We've come a long way — *Robert B. Rice* 207

PAPERS

Developments in exploration geophysics, 1969–74 — *F. K. Levin, J. F. Bayhi, J. W. Dunkin, J. D. Lea, D. B. Moore, R. K. Warren, and G. M. Webster* 209

The vertical array in reflection seismology—some experimental studies — *Paul C. Wuenschel* 219

Interval velocities from surface measurements in the three-dimensional plane layer case — *Peter Hubral* 233

The seismic wave system from a surface impact — *Harold M. Mooney* 243

Gravity terrain corrections using multiquadric equations — *Douglas H. Krohn* 266

Numerical inverse magnetotelluric problems — *Chao C. Ku* 276

An improved pulse transient airborne electromagnetic system for locating good conductors — *D. Gupta Sarma, V. M. Maru, and G. Varadarajan* 287

The use of thermal resistivity logs in stratigraphic correlation — *A. E. Beck* 300

A Western view of mining geophysics in the U.S.S.R. — *Isidore Zietz, Gordon P. Eaton, Frank C. Frischknecht, Martin F. Kane, and Calvin K. Moss* 310

DISCUSSIONS

On: "Special report of the Subcommittee on Polarity Standards" (Ben B. Thigpen, A. E. Dalby, and Ralph Landrum) by *W. T. Valenta* with reply by author 324

On: "The magnetotelluric method in the exploration of sedimentary basins" (K. Vozoff) by *D. L. Jupp and K. Vozoff* 325

REPORT

Seismic Crew Survey 329

DEPARTMENTS

Reviews 330
New Publications Received 335
Errata 335
Abstracts
- Annual Meeting 336
- *Izvestiya* 384
- *Geophysical Prospecting* 386
- Patents 389

Memorial
- John A. Gillin 392

Calendar of Meetings 393
Contributors 394
Personal Items 397
Expanding U. S. Academic Fleet 399
SEG Section Activities 401
Membership Applications Received 403
Looking Back 405
Amendments to the Constitution and Bylaws 406
Continuing Education Short Courses 408
Continuing Education Calendar 409
Announcements
- Nominees for the 1976–77 Executive Committee 410

Letter from SEG President to USGS Conservation Chief and reply 415
New Products and Services A-8
Society and Industry News Briefs A-28
Professional Directory A-33
Advertisers Index A-76

Vol. 41, No. 3 June 1976

PRESIDENT'S PAGE: A testimonial — *Robert B. Rice* 417

PAPERS

Interpretation of split-spread refraction data in terms of plane dipping layers — *Stephen H. Johnson* 418
Traveltime curves for reflections in dipping layers — *Anthony F. Gangi and Sung Jin Yang* 425
Scattering of elastic waves from depth-dependent inhomogeneities — *Paul G. Richards and Clint W. Frasier* 441
Theory and evaluation of the LaCoste and Romberg three-axis inertial platform for marine gravimetry — *Herbert D. Valliant and Lucien J. B. LaCoste* 459
Uranium assay logging using a pulsed 14-Mev neutron source and detection of delayed fission neutrons — *W. W. Givens, W. R. Mills, C. L. Dennis, and R. L. Caldwell* 468
Structure elucidation with borehole gravimetry — *Joseph R. Hearst and H. L. McKague* 491
A subsurface electromagnetic pulse radar — *David L. Moffatt and R. J. Puskar* 506
Numerical solutions of the response of a two-dimensional earth to an oscillating magnetic dipole source — *C. H. Stoyer and Roy J. Greenfield* 519
An automatic method of direct interpretation of magnetic profiles — *Sudhir Jain* 531

DISCUSSIONS

On: "Gamma-ray spectrometry in Central Morocco" (A. Demnati and H. Naudy) *by Edson S. Sampaio* with reply by author 542
On: "Search for geothermal seismic noise in the East Mesa area, Imperial Valley, California (H. M. Iyer) *by Lewis J. Katz and W. D. Wagner* with reply by author 542
On: "EM coupling, its intrinsic value, its removal and the cultural coupling problem (Jeffrey C. Wynn and Kenneth L. Zonge) *by Charles M. Swift, Jr. and Gerald W. Hohmann* with reply by authors 543

REPORTS

Petroleum Exploration in Canada — *R. O. Lindseth* 546
USGS Survey 553
Seismic Crew Survey 554

DEPARTMENTS

Reviews 555
New Publications Received 558
Abstracts
Izvestiya 559
Patents 562
Contributors 567
Calendar of Meetings 570
Executive Committee Meeting Report 571
Personal Items 572
SEG Silver Certificates 574
Looking Back 575
Announcements 577
Nominees for the 1976-77 Executive Committee 579
Section Activities 584
Letter to the Editor 586
Membership Applications Received 587
New Products and Services A-8
Society and Industry News Briefs A-16
Professional Directory A-33
Advertisers Index A-64

Vol. 41, No. 4 August 1976

PRESIDENT'S PAGE: Our Society's trademarks *Robert R. Rice* 591

PAPERS

2-D multiple reflections *Don C. Riley and Jon F. Claerbout* 592
Velocities of seismic waves in porous rocks *M. Nafi Toksöz, C. H. Cheng, and Aytekin Timur* 621
The detection and development of Silurian reefs in northern Michigan *W. G. Caughlin, F. J. Lucia, and N. L. McIver* 646
Exact wave-shaping with a time-domain digital filter of finite length *R. F. Mereu* 659
Near-bottom observations of 4 kHz acoustic reflectivity and attenuation *Robert C. Tyce* 673
Sea-gravimeter trials on the Halifax Test Range aboard *CSS Hudson*, 1972 *H. D. Valliant, J. Halpenny, R. Beach, and R. V. Cooper* 700
Recursion filters for digital processing of potential field data *B. K. Bhattacharyya* 712
Gravity and magnetic fields of polygonal prisms and application to magnetic terrain corrections *Donald Plouff* 727
Apparent resistivity of a perfectly conducting sphere buried in a half-space *Shri Krishna Singh and Juan Manuel Espindola* 742
Computer-assisted interpretation of electromagnetic soundings over a permafrost section *Jeffrey J. Daniels, George V. Keller, and J. J. Jacobson* 752

SHORT NOTES

Diagrams for magnetotelluric data *F. E. M. Lilley* 766
Autoregression order selection *Richard H. Jones* 771

DISCUSSION

On: "Experimental determination of effective demagnetizing factors for a short cylinder" (Knut Åm and Rune Otto Stemland) by *Sven-Erik Hjelt* with reply by author 774
On: "Computer migration of oblique seismic reflection profiles" (William S. French) by *William A. Schneider* with reply by author 776
On: "Inversion of gravity profiles by use of a Backus-Gilbert approach" (William R. Green) by *Ramesh Chander* with reply by author 777

REPORT

Statement by SEG President Rice on S-1864, the Energy Information Act 779
Geophysical Activity in 1975 *H. R. Espey* 780
Seismic Crew Survey 795
Ad Hoc Committee on Magnetic Field Models 796

DEPARTMENTS

Reviews, 798
New Publications Received, 804
Letter to the Editor, 805
Abstracts
Izvestiya, 806
Geophysical Prospecting, 808
Patents, 810
Contributors, 814
Looking Back, 817
Calendar of Meetings, 818
SEG Foundation Contributors, 819
Executive Committee Meeting Report, 820
Personal Items, 821
Section Activities, 823
Announcements, 825
Proposed Amendments to the Constitution and Bylaws, 826
Membership Applications Received, 830
New Products and Services, A-8
Society and Industry News Briefs, A-16
Professional Directory, A-33
Advertisers Index, A-74

Volume 41, No. 5 October 1976

PRESIDENT'S PAGE: SEG relations with the press — *Robert B. Rice* 835

PAPERS

V_p/V_s—A potential hydrocarbon indicator — *Robert H. Tatham and Paul L. Stoffa* 837
Structure independent velocity estimation — *Stephen M. Doherty and Jon F. Claerbout* 850
Effect of brine-gas mixture on velocity in an unconsolidated sand reservoir — *S. N. Domenico* 882
Fluid saturation effects on dynamic elastic properties of sedimentary rocks — *A. R. Gregory* 895
Residual static analysis as a general linear inverse problem — *Ralph A. Wiggins, Kenneth L. Larner, and Robert D. Wisecup* 922
Long wavelength static estimation — *Aaron H. Booker, A. Frank Linville, and C. B. Wason* 939
Microearthquake location using a maximum likelihood processor — *H. D. Leslie, R. P. Porter, and R. C. Spindel* 960
The corrective gradient projection method and related algorithms applied to seismic array processing — *Anthony F. Gangi and Bok S. Byun* 970
Shear-wave velocity versus depth in marine sediments: A review — *Edwin L. Hamilton* 985
A method for modeling the resistivity and IP response of two-dimensional bodies — *Donald D. Snyder* 997
Gravity vertical gradient measurements for the detection of small geologic and anthropogenic forms — *Zbigniew J. Fajklewicz* 1016
Use of decay patterns for the classification of anomalies in time-domain AEM measurements — *G. J. Palacky* 1031
The derivation of absolute units in electromagnetic scale modeling — *Brian R. Spies* 1042

SHORT NOTES

Improved normal moveout difference curve — *Poh-Hsi Pan* 1048
Modern standards for gravity surveys — *Carlo Morelli* 1051
Demagnetizing factors in nonellipsoidal samples—A review — *R. I. Joseph* 1052

REPORTS

National Magnetics Anomaly Map Committee 1055
COCORP Completes Second Field Test 1056
1975 Geophysical Accident Report 1057
Seismic Crew Survey 1058
SEG Resolution of Support of the APGS 1059

DEPARTMENTS

Reviews 1060
New Publications Received 1066
Abstracts
Geophysical Prospecting 1067
Izvestiya 1070
Patents 1073
Calendar of Meetings 1077
Contributors 1078
Looking Back 1081
Personal Items 1082
Executive Committee Meeting Report 1084
SEG Section Activities 1085
Announcements
1976–77 Executive Committee 1087
1976 Annual Meeting Technical Program 1091
Membership Applications Received 1097
Amendments to the Bylaws 1100
New Products and Services A-8
Society and Industry News Briefs A-26
Professional Directory A-37
Advertisers Index A-86

Vol. 41, No. 6 December 1976

PRESIDENT'S PAGE: The education of tomorrow's geophysicists — *Robert B. Rice* — 1259

PAPERS

Two probable late Cretaceous astroblemes in Western Canada—Eagle Butte, Alberta and Dumas, Saskatchewan — *H. B. Sawatzky* — 1261
Seismic reflection techniques for crustal structure studies — *J. A. Mair and J. A. Lyons* — 1272
Signal design in the "Vibroseis" technique — *Pierre L. Goupillaud* — 1291
Reflected and transmitted filter functions for simple subsurface geometries — *M. Schoenberger and F. K. Levin* — 1305
A dual-wavelength thermal infrared scanner as a potential airborne geophysical exploration tool — *Leonard A. LeSchack and Nancy Kerr Del Grande* — 1318
Reconnaissance gravity survey of Australia — *A. R. Fraser, F. J. Moss, and A. Turpie* — 1337
Topographic corrections for gradients in airborne gravimetry — *Sigmund Hammer* — 1346
Thoretical modeling of the magnetic and gravitational fields of an arbitrarily shaped three-dimensional body — *C. T. Barnett* — 1353
Application of the generalized linear inverse to the inversion of static potential data — *J. Cribb* — 1365
Gravity gradients and the interpretation of the truncated plate — *John M. Stanley and Ronald Green* — 1370
Automatic contouring of faulted subsurfaces — *G. Bolondi, F. Rocca, and S. Zanoletti* — 1377

SHORT NOTES

Net downgoing energy and the resulting minimum-phase property of downgoing waves — *Enders A. Robinson and Sven Treitel* — 1394
The magnetic equivalence of an anticlinal thin bed and a thin dipping dike — *M. J. Shalley* — 1397

DISCUSSION

On: "Early magnetic interpretation" (L. L. Nettleton) *by S. J. Pirson* with reply by author — 1401

REPORT

Seismic Crew Survey — 1402

DEPARTMENTS

Reviews — 1403
New Publications Received — 1408
Abstracts
Izvestiya — 1409
Geophysical Prospecting — 1412
Patents — 1414
Contributors — 1419
Calendar of Meetings — 1423
Looking Back — 1423
Memorial
Louis B. McManis — 1424
Personal Items — 1425
1976 Annual Report — 1429
Section Activities — 1481
Announcements — 1483
Executive Committee Meeting Report — 1484
Errata — 1485
Membership Applications Received — 1492
Index to Volume 41 — 1497
New Products and Services — A-8
Society and Industry News Briefs — A-18
Professional Directory — A-33
Advertisers Index — A-72

Vol. 41, No. 6A December 1976

SPECIAL ELECTROMAGNETICS SUPPLEMENT

Stanley H. Ward, Editor

PREFACE *Stanley H. Ward* 1103

PAPERS

Random networks and mixing laws *Theodore R. Madden* 1104
Electromagnetic lateral waves observed by earth-sounding radars *John W. Clough* 1126
The electromagnetic response of a conductive inhomogeneity in a layered earth *J. J. Lajoie and G. F. West* 1133
Practical airborne EM (AEM) interpretation using a sphere model *G. S. Lodha and G. F. West* 1157
Field test of the magnetometric resistivity (MMR) method *R. N. Edwards and E. C. Howell* 1170
Earth conductivity determinations employing a single superconducting coil *H. F. Morrison, William M. Dolan and Abhijit Dey* 1184
Statistical evaluation of electrical sounding methods. Part I: Experiment design *W. E. Glenn and S. H. Ward* 1207
Statistical evaluation of electrical sounding methods. Part II: Applied electromagnetic depth sounding *S. H. Ward, B. D. Smith, W. E. Glenn, L. Rijo, and J. R. Inman, Jr.* 1222
Negative IP effects from layered media *Misac N. Nabighian and Charles L. Elliot* 1236

Contributors 1256